

**PROCEDURES FOR VERIFYING PENETRATION TEST  
APPARATUS  
(AASHTO T 49)**

**A. PURPOSE**

This procedure provides instructions for checking the equipment used to perform the penetration test.

**B. APPARATUS REQUIRED**

1. Balance, readable to 0.01 g.
2. Microscope or eyepiece, 10X.
3. Metal block, 10.0 mm high; metal block, 25.4 mm (1 in.) high.
4. Support block, 75-87.5 mm high.
5. Ruler, readable to 1 mm.
6. Calibrated stopwatch, readable to 0.1 second.

**C. PROCEDURE**

1. Remove the spindle, 50 and 100 g weights from the penetrometer, Record the mass of each to the nearest 0.01 g.
2. Weigh each needle to the nearest 0.01 g. Visually examine each needle with a microscope or eyepiece. Each needle should be straight and free of burrs. The base of each needle should be flat.
3. If an automatic timing mechanism is used on the penetrometer, start the calibrated stopwatch when the plunger is released and stop the calibrated stopwatch when the plunger stops. Record the time indicated on the calibrated stopwatch to the nearest 0.1 sec. If a manual device is used to release the plunger, check the accuracy of the timing device used over a 60-sec interval. Record the elapsed time to the nearest 0.1 sec.
4. Place the support block on the base of the penetrometer. Place the 10 mm block on the support block. Adjust the needle height so that its tip just touches the top of the 10 mm block. Remove the 10 mm block and release the needle to the support block. Adjust the instrument to measure the distance moved. Repeat Step 4 using the 25.4 mm (1 in.) block. Determine dial accuracy by comparing readings with the height of the blocks.
5. Measure and record the distance from the perforated shelf to the bottom of the water bath. Measure and record the distance from the perforated shelf to the surface of the water. Measure and record the distance the thermometer is immersed in the water.
6. Observe and record the temperature of the water in the bath to the nearest 0.1 °F (0.05 °C).

## EQUIPMENT VERIFICATION RECORD

Verified By: _____	Date: _____
Equipment: <u>Penetrometers</u>	Location (Lab): _____
Identification No.: _____	Verification Frequency: <u>6 months</u>
Previous Verification Date: _____	Next Due Date: _____
Verification Equipment Used:    Calibrated balance, SN: _____    10X Eyepiece, SN: _____	
Calibration block, SN: _____    Ruler, SN: _____    Stop watch, SN: _____	
Verification Procedure: <u>(In-house) OMR-CVP-54 / AASHTO T 49</u>	

1. Penetrometer	1	2	3	4
Dial accurate to 0.1 mm?				
Spindle readily detached (after 1/76)?				
Mass of spindle: 47.45 – 47.55 g?				
Mass of 50 g wt.: 45 - 55 g?				
Mass of 100 g wt.: 99.95 – 100.05 g?				
Needle moves vertically? Base flat?				
2. Penetrometer needles				
Needle No.? (optional)				
Mass of needle: 2.45 – 2.55 g?				
Needle Dia.: 1.00-1.02 mm (0.0394-0.0402 in.)?				
Ferrule Dia.: 3.15 – 3.25 mm (0.116 – 0.124 in.)?				
Needle straight?				
Mounted coaxially?				
Surface finish OK?				
End in good condition?				

At least three (3) satisfactory needles available (for penetrations over 200)? \_\_\_\_\_

### 3. Water Bath

- (a) Capable of being maintained at a temperature varying not more than 0.1 C (0.2 F) from test temperature? .....
- (b) At least 10 liters of water in bath? .....
- (c) Perforated shelf at least 100 mm below surface of water and at least 50 mm from bottom of bath? .....
- (d) Water in bath clean? .....

### 4. Thermometer for Water Bath

- (a) Any thermometer or thermometric device with 0.1 c (0.2 F) subdivisions? .....
- (b) Thermometer used calibrated? .....
- (c) Recommend that thermometer be immersed to level of shelf? .....

### 5. Transfer Dish for Container (for penetrations made outside of bath)

- (a) Capacity of at least 350 ml? .....
- (b) Sufficient depth for water to cover sample container? .....
- (c) Means of preventing rocking of container provided? .....

### 6. Timing Device

- (a) Automatic timing device on penetrometer? .....
- (b) Accurately calibrated to provide interval  $\pm 0.1$  s? .....

### 7. Light Source: Facility for illuminating surface of specimen? .....